

Kanji ONO*: **On the chromosomes of *Dendroligotrichum dendroides* (Hedw.) Broth. from Patagonia**

小野莞爾*: パタゴニア産 *Dendroligotrichum dendroides* (Hedw.) Broth. (蘚類) の染色体について

Dendroligotrichum dendroides (Hedw.) Broth. is a moss belonging to Polytrichaceae. The occurrence of this species is restricted to several regions of the Southern Hemisphere, i.e., Chile, Juan Fernandez Is., West Patagonia, Magellan's Str., Tierra del Fuego Is., and New Zealand (Herzog 1926). This species is one of the large-sized mosses with a long gametophytic axial part ranging between 20 cm to 30 cm (Fig. 1).

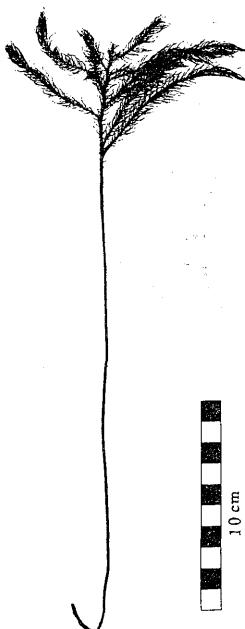


Fig. 1. A male gametophyte of *Dendroligotrichum dendroides* (Hedw.) Broth.

In the present paper the karyological observations are dealt with. The materials observed were collected by T. Seki** in a *Nothofagus* forest at the basin of Exploradores Riv., Chile. There has been no report on the chromosomes of this species. In the present investigation, it was found that the chromosome number in the female gametophyte was $n=7$ (Figs. 2c, 3c). This agrees with the basic number ($x=7$) of Polytrichaceae. Therefore, it was found that this species was a monoploid plant. Individuals of $n=7$ chromosomes could be distinguished morphologically into A, B, C, D, E, F and m as reported in the Japanese Polytrichaceae (Ono 1970). Chromosome A, which was the longest in the complement (4.3μ), was a V-shaped ele-

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ment having a constriction submedianly ($F\% = 47$) and a small constriction near the distal end of the long arm. This chromosome was the H_1 which had plenty of heterochromatin as shown in Japanese Polytrichaceae. Chromosome B was the H_2 of which the heterochromatin showed negative heteropycnosis at metaphase. This chromosome was $2.8\ \mu$ in length and was J-shaped ($F\% = 39$). Chromosome C ($3.7\ \mu$, $F\% = 46$) was V-shaped. Chromosome D ($2.7\ \mu$, $F\% = 11$) was I-shaped. Chromosome E ($4.1\ \mu$, $F\% = 32$) and chromosome F ($2.7\ \mu$, $F\% = 37$) were J-shaped. Chromosome m ($2.4\ \mu$) was the shortest in the complement and a J-shaped element ($F\% = 38$). This chromosome was the h which had heterochromatin at all of the short arm and at the proximal region of the long arm.

At prometaphase the three heterochromatic chromosomes, H_1 , H_2 and h, were observed showing differential condensation of segments (Fig. 2 b). In the short arm of H_1 the distal region occupying about $2/3$ of the arm

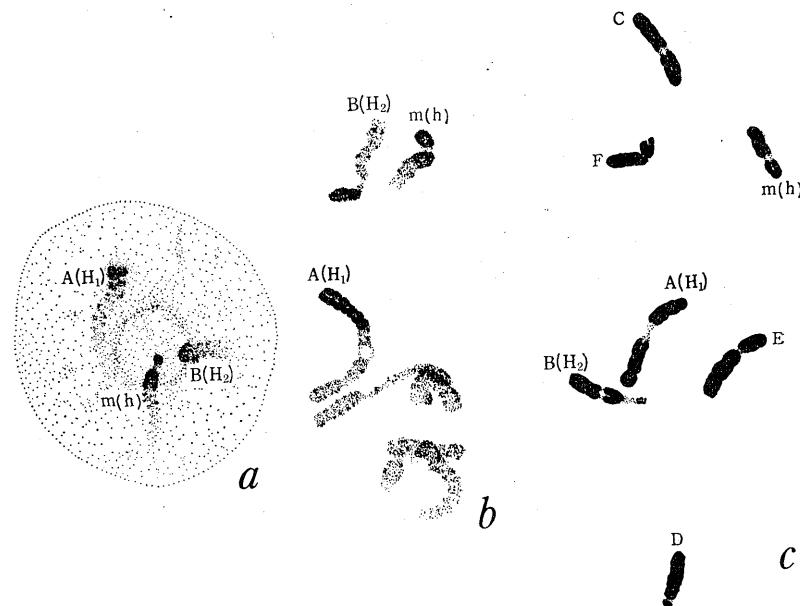


Fig. 2. Heteropycnosis and mitotic chromosomes in a female gametophyte of *Dendroligotrichum dendroides* (Hedw.) Broth. a. interphase nucleus, b. prometaphase, c. metaphase. $\times 4000$.

was heterochromatic, and the rest of this arm and all of the long arm were euchromatic. Such a differential condensation has been also observed in the X-chromosome of Japanese *Polygonatum* species (Ono 1970). The heterochromatic segment of H_2 was found to be positive heteropycnotic at this stage, while it was found to be negative heteropycnotic at metaphase. The short arm of this chromosome was $1.7\ \mu$ in length, which was composed of heterochromatic segment ($1.0\ \mu$) and euchromatic segment ($0.7\ \mu$). Its long arm was entirely euchromatic and $2.0\ \mu$ in length. Accordingly, this chromosome is a V-shaped element, having high value of $F\%$ (46%). In interphase nucleus, the heterochromatins of H_1 , H_2 and h were observed, forming heterochromatic bodies respectively (Figs. 2a, 3a). The heterochromatic bodies of H_2 and h were found entering into the nucleolus and forming a nucleolius respectively.

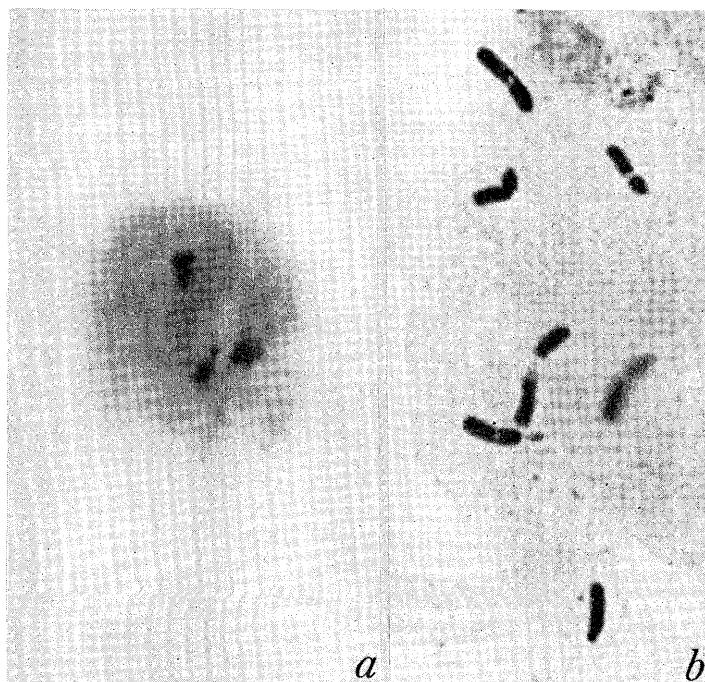


Fig. 3. Photomicrographs of interphase nucleus and metaphase chromosomes drawn in Fig. 2a and c. $\times 4000$.

The karyotype of *Dendroligotrichum dendroides* was formulated to be $K=7=V(H_1)+V(H_2)^{nh}+V+I+2J+m(h)$.

A comparison with the karyotypes of the present species and the female karyotypes of the five species of Japanese Polytrichaceae previously reported

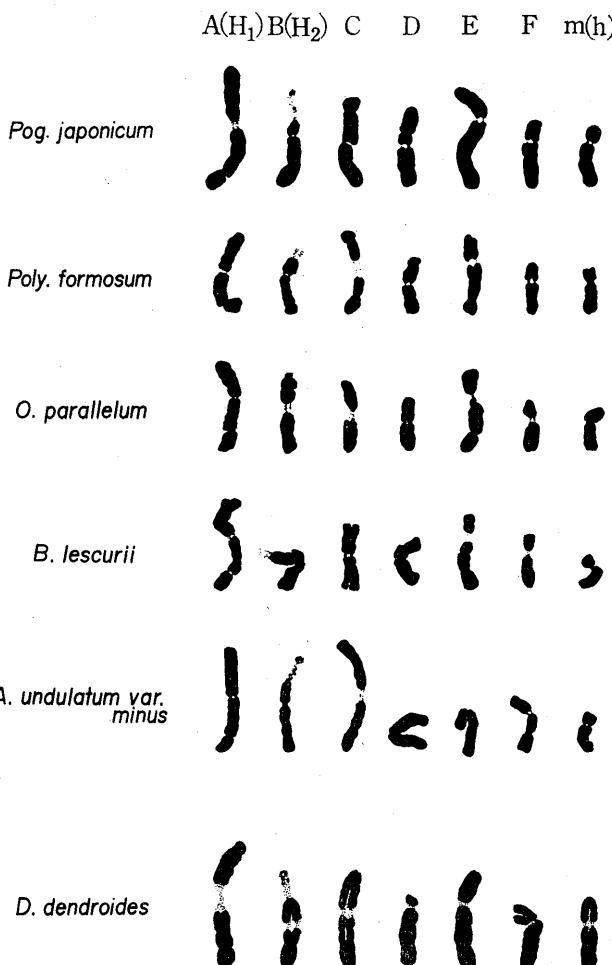


Fig. 4. Karyotypes of six taxa in Polytrichaceae. The karyotypes were illustrated by female karyotypes, except for *B. lescurii* of which the sexuality of the materials studied was not determined.

(Ono 1970), i.e., *Polygonatum japonicum* Sull. et Lesq., *Polytrichum formosum* Hedw., *Oligotrichum parallelum* (Mitt.) Kindb., *Bartramiopsis lescurii* (James) Kindb., and *Atrichum undulatum* var. *minus* (Lam. et De Cand.) Par. is shown in Fig. 4. The karyotypes of the six taxa showed a high similarity to each other in all of the chromosomes of the complements, except for chromosome D of the present species, *Dendroligotrichum dendroides*. The chromosome D of this species was found to be I-shaped, while those of the other five species were V-shaped. Yano (1957) has reported the karyotype formula $K=V(H)+3V+2J+m(h)$ in 14 taxa of Japanese Polytrichaceae. The same karyotypes were reported by Chatterjee and Gangulee (1970) in two taxa of Indian Polytrichaceae. Ramsay (1964) has reported the karyotypes similar to these in three taxa belonging to genus *Dawsonia* of Australian Polytrichaceae, though the longest V-shaped chromosome was found without any heterochromatins. The karyotype formula $K=V(H_1)+V(H_2)^{nh}+2V+2J+m(h)$ of Japanese Polytrichaceae reported by the present author (Ono 1970) is found to be similar to that of the above reports except for $V(H_2)^{nh}$. Therefore, *Dendroligotrichum dendroides* studied in the present paper can be said to have a new karyotype in Polytrichaceae.

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Literature

Chatterjee, A. K. and H. C. Gangulee. 1970. Cytological studies on the mosses of eastern India, VII. Karyotypes. *Nucleus* 13: 118-125. Herzog, T. 1926. *Geographie der Moose*. Jena, Gustav Fischer, 439. Ono, K. 1970. Karyological studies on Mniaceae and Polytrichaceae, with special reference to the structural sex-chromosomes III. *Journ. Sci. Hiroshima Univ.*, Ser. B, Div. 2, 13: 167-221. Ramsay, H. P. 1964. The chromosomes of *Dawsonia*. *Bryologist* 67: 153-162. Yano, K. 1957. Cytological studies on Japanese mosses. III. *Mem. Takada Branch, Niigata Univ.* 1: 129-159.

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バタゴニア産蘚類 *Dendroligotrichum dendroides* (Hedw.) Broth. (Polytrichaceae) の核学的観察を行なった。本種の染色体に関する報告はまだなかったが、筆

者は雌性配偶体で $n=7$ の染色体数を算定した。これは從来多くの研究者によって報告されている Polytrichaceae の基本数 $x=7$ と一致し、本種は1倍体であることがわかった。

体細胞分裂の中間期、前中期、中期の観察から、本種にも先に筆者 (Ono 1970) が日本産 Polytrichaceae の各種で報告したような3個の異質染色体 (H_1, H_2, h) の存在することがわかった。しかし、本種の核型は日本産 Polytrichaceae のそれと比較して2個のV型染色体の1個 (D染色体) がI型に変化しており相違が見られた。すなわち、本種の核型式は $K=V(H_1)+V(H_2)^{nh}+V+I+2J+m(h)$ で示されるが、これは Polytrichaceae ではこれまでに報告されていない新らしい核型である。

○コモチオオアワガエリ (新称) について (水島正美) Masami MIZUSHIMA:
On a viviparous form of *Phleum pratense*

ヨーロッパ原産の帰化植物オオアワガエリは何所にでも生えるので、特に草体の大小に著しい変異を示す。此の雑草に胎生形が見出されるので報告しよう。信州南佐久郡南牧村の野辺山が原で1956年10月21日に筆者が採集した (MAK-5831標本)。本邦には未だ正式報告がないようであるから、標題の新和名を命じておく。学名は次のものが当る: *Phleum pratense* L. f. *viviparum* (S. F. Gray) P. Louis-Marie in *Revue d'Oka* 14: 144-145, 1940; *Problèmes de biologie végétale* 59, f. 10, no. 3, 1941—Fernald, *Gray's Man. Bot.* 8 ed. 165, 1950.

上記の標本では花穂の所々に葉を生じ、大部分の小穂は正常のように見える。どの小穂もえいは葉化せず、1個ある小花が先祖返りをしている。即ち相抱くえいに囲まれて、1枚の葉 (2-12 mm長) が形成されている。えいが約4 mm長 (芒を除く) であるから、正常小穂に見えるものゝ多くも亦不稔化していると見て差支ないだろう。此の場合、葉化するのは雌蕊だけらしく、此の葉とえいとに挟まれて3個の退化雄蕊が見られる小穂、其の部位に微小な1個の鱗片がある小穂、或は変成葉とえいのような小穂では何の痕跡も認められない等の場合を観察した。上記の標本は僅か1茎であるが、此の個体に関する限り、どうも小花の構成部分の中で、外花えいと内花えい、鱗被、雄蕊は退化消滅の方向にあり、雌蕊のみが色々な程度に葉化しているように見える。小穂の胎生現象は秋によく起るらしいとの報告があり (P. Louis-Marie 1941), オオアワガエリやコスズメノチャヒキ (*Bromus inermis* Leyss.) の例を述べている。それによればえいと内外花えいとが葉化するのが常で、雄蕊と雌蕊との消滅、残存は不定だと云うので、筆者の採集品の場合と異なる。胎生化の機構の解明は既に取組まれていよう。何方か研究物の所在を御教示下されば幸甚である。

(東京都立大学 牧野標本館)